

REMARKS

Claims 1-12 are pending in the application and stand rejected. By the above amendment, claims 1, 5 and 6 have been amended and claim 4 has been canceled without prejudice. Reconsideration of the claim rejections is respectfully requested in view of the above amendments and following remarks.

Claim Rejections Under 35 U.S.C. §112

Claims 1-3 and 7-9 were rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth on page 2 of the Office Action.

With respect to claims 1 and 7, Applicants respectfully traverse the rejection on the grounds that the term “resistance” is definite, as being a well-known term of art. The term “resistance” is commonly used to describe an electrical property of a material. For instance, Examiner is directed to the cited references of Roderick and Ke in which the term “resistance” of a material is repeatedly used (see, e.g., Roderick (Col. 8, lines 50-52; Col. 9, lines 11-14, Col. 10, lines 36-39) and Ke (Col 13, lines 44-45)).

The term resistance is well-known and readily understood to refer to the resistance to current flow along the direction of current flow. For instance, it is well known that resistance of a material can be determined, for example, by multiplying the resistivity, p , (ohms-cm) of the material by the length, L , of the material along direction of the current flow, and dividing by the cross-sectional area, A , of the material perpendicular to the current flow (i.e., $p * L / A$). In fact, Examiner even acknowledges that resistance depends on the geometry and resistivity of the material.

With regard to the claimed inventions, it is clear to one of ordinary skill in the art the “resistance” refers to the resistance to current that flows along the direction of the

electrical fields that are coupled through the wafer and edge ring between the cathode (or anode) and the plasma sheath during a plasma etch process. Accordingly, the withdrawal of this rejection is respectfully requested.

Claim Rejections Under 35 U.S.C. §103

Claims 1-3 and 7-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over applicants' admitted prior art (AAPR) in view of U.S. Patent No. 6,074,488 to Roderick et al. ("Roderick").

At the very least, it is respectfully submitted that the above cited combination of AAPR and Roderick is legally deficient to establish a *prima facie* case of obviousness against claims 1 and 7 because, the cited combination does not disclose or suggest the *electrical resistance of the edge ring being less than the electrical resistance of the wafer*, as essentially claimed in claims 1 and 7. Indeed, it is respectfully submitted that Examiner's conclusion of obviousness with respect to an edge ring having a lower

resistance than a wafer is nothing more than impermissible hindsight reasoning based on Applicants' disclosure.

In particular, Examiner acknowledges that AAPR does not disclose resistivity of the edge ring. Further, although Roderick arguably discloses a "collar ring" (230) having a low resistance, which may comprise silicon (see Col. 8, lines 28-52), there is no teaching or suggestion in Roderick regarding the *relationship between the resistance of an edge ring and the resistance of a wafer for purposes of uniform etching*, as essentially claimed.

It is respectfully submitted that Examiner's basis for obviousness, which is essentially grounded on the "resistivity" of an edge ring made of silicon being similar to

that of a wafer (see page 2 of the Office Action), *misses the point*. Two components made of the same material (e.g., silicon) having the same “resistivity” can have different resistances depending on, for example, the thickness of the components. Examiner even acknowledges this in the Office Action. Therefore, an edge ring and wafer made of silicon can have different resistances depending on length, area, etc.

Here, there is simply no teaching or suggestion in Roderick regarding the relationship of resistance of the edge ring being lower than the resistance of the wafer, as claimed, for purposes of e.g., uniformly etching a portion of the wafer being supported by the edge ring during an etch process, as claimed in claim 7.

In fact, Roderick specifically teaches that the purpose of the collar ring (230) having a low resistance is to be able to couple a substantial amount of RF power from the peripheral region of a conductor (210) to the plasma sheath surrounding the perimeter of the substrate (see, e.g., Col. 2, lines 40-47; Col. 7, lines 31-37; Col. 8, lines 28-34). In other words, the collar ring (230) functions as an extension of an electrode (155b) to thereby increase the effective capacitively coupled area of the electrode (155b) (see, Fig. 3, Col. 7, lines 7-16). This is needed because as shown in Fig. 3, the electrode (155b), which is capacitively coupled to the conductor (210), is shorter than the wafer (130). Again, there is no teaching or suggestion in Roderick regarding the *resistance of the wafer with respect to the resistance of the collar ring*.

Therefore, for at least the above reasons, claims 1 and 7 are believed to be patentable and non-obvious over the combination of AAPR and Roderick.

Claims 4-6 and 10-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over AAPR, in view of Roderick and further in view of U.S. Patent No.

6,284,093 to Ke et al. ("Ke").

To the extent that claim 1 has been amended to include subject matter similar to canceled claim 4, the patentability of claim 1 will be further addressed with respect to the combination of AAPR, Roderick and Ke.

Claim 1 is believed to be patentable over the combination of AAPR, Roderick and Ke, because such combination does not teach or suggest an edge ring comprising a slanted step portion whose surface forms an angle in a range of about more than 55 to about 80 degrees relative to a normal to the wafer surface.

Neither AAPR nor Roderick remotely teach or suggest an edge ring comprising a slanted portion but Examiner relies on Ke as disclosing such feature. Ke discloses an elevated collar (30) (see Figs 2 and 3, for example) having an angle in the range of 20-55 degrees relative to a normal of the wafer surface (i.e., a 110-145 degree obtuse angle relative to the surface of the wafer) (see, e.g., Col. 18, lines 13-33). Ke discloses that a more preferred range is 30-45 degrees and that a 45 angle is preferred because it maximizes horizontal scattering (Col. 18, lines 43-45). However, Ke does not disclose or suggest an angle in the range of more than 55 degrees to 80 degrees as claimed.

Therefore, claim 1 is believed to be non-obvious over the combination of AAPR, Roderick and Ke.

In addition, all claims that depend from claims 1 and 7 are believed to be patentable and non-obvious over any of the cited combinations at least by virtue of their dependence from respective base claims 1 or 7.

For all of the above reasons, withdrawal of the obviousness rejections is respectfully requested. Applicants request favorable consideration of the application as now presented.

Respectfully submitted,



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